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REPLY TO
ATTENTION OF.

DEPARTMENT OF THE ARMY
HEADQUARTERS, TRIPLER ARMY MEDICAL CENTER
TRIPLER AMC, HAWAII 96859-5000



HSBK-DCA-A

28 June 1989

MEMORANDUM THRU Chief of Staff/Preceptor, Tripler Army Medical
Center, ~~Tripler~~, HI 98659-5000 *PCML-28 JUN 89*

FOR Residency Committee, U.S. Army-Baylor University Graduate
Program in Health Care Administration (HSHA-IHC), Academy
of Health Sciences, U.S. Army, Ft. Sam Houston, TX
78234-6100

SUBJECT: Graduate Management Project

In accordance with the instructions contained in the
Administrative Residency Manual, subject project is herewith
submitted.

Encl

Michael D. Daley
MICHAEL D. DALEY
Major, MS
Administrative Resident

"REPRODUCED AT GOVERNMENT EXPENSE"

A Study To Determine
The Most Effective Method of
Providing Computer Literacy Training
to New Employees at
Tripler Army Medical Center.

A Graduate Management Project
Submitted to the Faculty of
Baylor University
In Partial Fulfillment of the
Requirements for the Degree

of
Master of Health Administration
by

Major Michael D. Daley, MSC
June 1989

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"REPRODUCED AT GOVERNMENT EXPENSE"

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Graduate Management Project

June 18, 1989

Introduction

Tripler Army Medical Center (TAMC) is the largest military medical treatment facility in the Pacific. TAMC's mission is to provide outpatient and inpatient care to over 425,000 beneficiaries from throughout its 3,700,000 square mile service region. TAMC also has the mission of providing graduate training in 13 disciplines. To accomplish this mission TAMC operates a 537 bed hospital and numerous clinics. The center also employs in excess of 3,000 personnel.

To manage this enormous mission TAMC is making extensive use of automation. Microcomputers and supporting software applications have proliferated throughout the facility. At present, over 300 stand-alone microcomputers and 60 software application packages are in use.

In addition to these stand-alone microcomputers, TAMC has three types of multi-user minicomputers in operation, including: 1) Intel 310 minicomputers; 2) Wang minicomputers, and; 3) two Sperry minicomputers which provide automation support to many of TAMC's administrative offices. One of the Sperrys supports 50 workstations located throughout the headquarters, Department of Nursing, Patient Administration Division, Inspector General, Graduate Medical Education, and Administrative Services.

The second Sperry supports eight workstations in the Information Management Division. All workstations are connected to the Sperrys via a local area network. Software resident on the Intel 310 and Sperry minicomputers supports word processing, spreadsheet, data base management, communications and electronic mail applications. Software resident on the Wang minicomputers supports word processing.

Because automation is so integrated in the day-to-day operation of TAMC, it is essential that new employees receive timely and effective training on automation in general, and on the specific applications required for them to do their jobs. This training is necessary not only to make the new employee productive, effective and efficient, but to recruit personnel who may suffer from computer anxiety and to minimize the turnover of personnel that will occur if employees are placed into positions requiring the use of tools with which they are unfamiliar (Cambre and Cook 1987, 15).

There are other considerations when training is not provided. One of the major considerations is the impact on costs. Certainly there is an identifiable and expensive cost to providing training, however, there are also costs to not providing training, though they may not be so readily quantifiable. One of the costs for failing to provide training is employee time. It takes an employee three to six times longer to learn the necessary computer skills when no training is provided (Karten 1988, 116). This estimate assumes that the employee takes the initiative to learn. Often times the

employee will opt not to utilize the computer at all, or will minimize use by accomplishing only the basic requirements of the job (Wolman 1988, 40-43). In these instances the capital invested to acquire the computer assets receives a significantly smaller return. A second repercussion is a lost opportunity--the value of the benefit that could be achieved (Karten 1988, 116). An employee trained on the use of the computer will have the skills to maximize its utilization and apply its capabilities to better accomplish his or her job.

Conditions Which Prompted the Study

According to Major (P) Gary R. Gilbert, TAMC's Chief, Information Management Division (IMD), the Customer Support Center of the IMD is responsible for providing training. Major Gilbert stated that this activity is not currently staffed with sufficient resources to accomplish routine, ongoing training. The TAMC Customer Support Center did have two additional requirements recognized when Health Services Command conducted a manpower survey at TAMC in August 1988. Training composed a portion of the workload used in justifying these requirements.

In an interview with Ms. Carol Brown, Chief, Customer Support Center, there are several alternatives to training provided by in-house staff. These alternatives include:

- a. courses sponsored by local colleges;
- b. courses sponsored by the Fort Shafter Director of Information Management (DOIM);

- c. courses sponsored by local computer stores;
- d. training through the use of TAMC owned training aids, i.e., video tapes, or computer assisted instruction.

Ms. Brown stated that numerous issues currently preclude use of the above alternatives or, at least, limit their effectiveness. Specifically, attendance to courses sponsored by external sources is not routinely funded because less costly training can be provided using the training aids available within TAMC. Yet, training aids are not utilized for a number of reasons, including:

- a. IMD does not have a training room equipped to support the use of the aids (requirements include a VCR, monitor, and microcomputer);
- b. while individuals may check out the training aids, VCR and monitor, and move them to their work area for training, the work area is not a suitable environment for learning as the employee will be frequently interrupted;
- c. access to the training is considered too difficult so employees do not attempt to use the resources available.

Additionally, while training aids are available to support the four application packages with the highest density, dBASE III/III PLUS (data base management), Enable (integrated package), MultiMate (word processing) and Lotus 1-2-3 (spreadsheet), no aids are available for the other 25 plus programs in use in the facility. This is particularly a problem with the Sperry, Wang and Intel applications which have high user densities.

Microcomputers and minicomputer workstations are not the only automation in use at TAMC. The Composite Health Care System (CHCS) is currently being implemented at TAMC. CHCS is a DOD sponsored, tri-service, hospital information system designed to provide on-line, integrated support to health care providers and administration. TAMC is currently operating three other tri-service systems, the Central Processing and Distribution System (CPD), TRIFOOD, and TRILAB. This project will not consider the training needs for any of the tri-service systems for the following reasons:

- a. Information about CHCS is extremely limited, thereby precluding the precise identification of the training need.
- b. Personnel authorizations have been allocated to provide personnel with CHCS training.
- c. CPD and TRIFOOD are limited in their scope and have small usage density.
- d. TRILAB is being replaced by CHCS.

Statement of the Problem

To determine the most effective method of providing computer literacy training to new employees at Tripler Army Medical Center.

Objectives

The objectives of this study were to:

1. Conduct a review of literature pertaining to the following topics:

- a. Computer literacy
- b. Training methodologies
- c. Information Centers

2. Identify current and projected types and quantities of hardware and software within the facility (less Tri-Service Systems), and the current and planned user applications. This data will be stratified by job series of the users.

3. Based upon information gathered in the literature review and the data collected for objective two, specify the minimum proficiency level personnel should exhibit upon completion of training, and obtain the concurrence of the Chief, IMD.

4. Determine the turnover rate of employees stratified by job series.

5. Based on the information gathered in objectives one, two and three, project the amount and type of training required and the frequency with which training for specific applications will be necessary.

6. Identify the alternatives for providing training that will produce graduates who exhibit accomplishment of the proficiency levels identified in objective three.

7. Determine the costs, advantages and disadvantages for each alternative.
8. Recommend the optimal solution.

Criteria

The success of this project will be determined by its acceptance as the best solution by the TAMC Chief of Staff.

Assumptions

1. Information provided by department, division and office chiefs specifying the number of employees with job requirements for use of automation, and the software applications they must be literate in, is accurate.
2. Personnel turnover data collected from the Civilian Personnel Office--Hawaii and the TAMC Personnel Division are accurate.
3. Personnel turnover for each job series occurs at the same rate throughout the year, remains constant from year to year and occurs randomly within each job series, i.e., the turnover rate in each job series is proportionately equal among users and non-users of computers.
4. All new employees hired into positions with a requirement to use automation will require computer literacy training.

Limitations

None.

Review of the Literature

Computer Literacy and Minimum Proficiency Levels

If computer literacy is the goal, computer anxiety is the barrier to accomplishing the goal, while knowledge and experience are the means to overcome the barrier. This knowledge and experience is gained through training and sustained through practice (Shore 1987, 12-27). This statement is supported in a study completed by Cambre and Cook. The study analyzed computer anxiety as a function of age and gender, then measured the influence a one week course in computer literacy had on the participants' anxiety levels. Findings demonstrated that females were initially more anxious than males and adults were more fearful than children and teenagers, however, participation in the introductory computer course significantly reduced computer anxiety (1987, 20).

Only one journal article was located which specifically addresses the subject of minimum proficiency levels. This article, by Lenkway, discusses how Florida has legislated computer literacy to be a basic skill taught in schools. Seven minimum student performance standards in computer literacy were developed by educators and parents in meetings across the state.

The seven standards ranged from knowing how to operate a computer to understanding the functions of the hardware components, the role of software and the process of programming. Satisfactory accomplishment of the seven standards is objectively measured by performance on 44 skills ranging from "powering up" the computer to arranging programming steps in a logical sequence (1986, 74-77).

Other articles, while not specifying minimum proficiency levels, implied that the ability to use the system to accomplish its intended function is the minimum proficiency level (Plummer and Warnock-Matherton 1987, 6-9; Bagby 16.7 (1985), 30-35).

Measurement of achieving the minimum proficiency level varied throughout the literature ranging from self evaluation of improvement (Plummer et al. 197, 8), to a pretest-posttest design combining a self evaluation test for competency and a true-false section for cognition (Reutzel and Smorynski 1986, 622).

Sources of Training

Numerous sources of training are identified in the literature. Among these are: local computer stores, user group training, custom third-party training and internal technical experts (Coppolino 1986, 60-62). Coppolino identifies the major disadvantage of using sources external to the organization is cost, while the major advantage is the quality of instruction and the avoidance of increasing your internal staff. While

internal staff may provide good training, external training is considered excellent by Coppolino, primarily because companies in the business of training must be good to survive (1986, 60-62).

Mr. Robert Sonada, Chief, Ft. Shafter Information Center, stated that the Information Center (IC) is the responsible activity for providing user training. The installation Director of Information Management (DOIM) is responsible for operation of the IC. Mr. Sonada stated that the advantages of an IC are that they reduce duplication of effort and enhance management control. The major disadvantage is that the IC, at least as operated at Ft. Shafter, is not very responsive. He stated that training is provided to TAMC and other tenant activities on a reimburseable basis; training is provided by vendors with whom the IC has contracted, and; no special methodology is used to determine user training needs, therefore, training is scheduled based on the perception of need by IC personnel.

Training Mediums

The most current trends in computer training are CBT (computer based training) and IV (interactive video). A recent survey of Information Centers (IC) by Crwth Computer Coursewares found that 52% of the ICs are currently using CBT and another 25% are exploring, piloting or planning its use ("Modified Rapture" 1988, 10). The survey reported that only 11% of respondents currently use IV, though 34% are exploring, piloting

or planning IV use ("Modified Rapture" 1988, 10). The survey also asked participants to specify the benefits of CBT. Over 80% of the respondents felt that CBT improved training availability, created fewer scheduling problems, provided more individualized training, and could be used to more effectively reach remote users. Over 70% felt that CBT provided more cost effective training and frees trainers from routine teaching. Sixty two percent felt that use of CBT improved transfer of skills ("Modified Rapture" 1988, 11).

While CBT and IV are currently the training media in vogue, other media, including classroom, workbooks, and video tape are still in use. Which is best has been the topic of numerous research efforts. Most of these efforts were flawed because the instructional content of the mediums being tested were different (Clark 1983, 445). Clark, in a more recent article, states that "...it is the instructional methods carried by the medium that facilitate--or hamper--the learning." (1988, 32). The term "instructional methods" refers to such techniques as use of examples, practice matched to objectives and feedback (Clark 1988, 32).

Note that Clark's analysis was focused on learning in general and not specifically on computer literacy. The study does not, therefore, account for potential learning disabilities which may result from computer anxiety. Craven points out that many hospital personnel believe computers are dehumanizing, difficult to understand and job threatening. She goes on to state that the success of a system in a hospital is dependent on

the time and effort spent with the staff in training (1985, 49). The implication in the article is that a human providing training on a dehumanizing object will create a better environment for learning than if some other mode were used. Ms. Barbara Lawton, a CHCS trainer at TAMC, echoed this belief stating that people just becoming computer literate learn more rapidly if someone is there to "hold their hand." Additionally, Mr. Steve Koelle, Chief, Customer Support Branch, HCSSA, Ft. Sam Houston, Texas, stated that while his organization provides training via both instructors and tutorials, the knowledge transfer is much greater in instructor led training. He went on to say that most people, when given a tutorial to learn from, set the tutorial aside and learn from their mistakes as they go.

Foshay writes that it is not which medium is the best, its which medium is most appropriate for the subject being taught. He states "different media are best for carrying different kinds of information" (1985, 23). Table 1 is a representation of this statement.

Table 1

Medium to Content Match. Strong match represented by xx, moderate match by x and weak match by no mark.

MEDIUM	CONTENT TYPE			
	Verbal	Visual	Sequence Motion	Group Interaction
Lecture	x			
Simulation			xx	
Video or Film	x	xx	xx	xx
Text	xx	x		x
CBT	xx	x	x	
IV	xx	xx	xx	x

Source: Foshay 1985, 23.

A second factor to consider is the match between the medium and the potential for interaction. A medium that supports the needed interaction must be selected (Foshay 1985, 23). Virtually all of the literature reviewed stressed the need for hands on training with the computer and software (Coppolino 1986, 59; Lewis 1988, 8; Gibson and Rose 1986, 203). Table 2 shows the medium to interaction match.

Table 2

Medium to Potential for Interaction Match. Strong match represented by xx, moderate match by x and weak match by no mark.

POTENTIAL FOR INTERACTION					
			Questions & feedback	Questions & answers analysis & feedback	Simulation
MEDIUM	Frequency (per learner)	Questions Only	Only		
Lecture		xx	xx	xx	
Simulation	x		xx	x	xx
Video or Film	xx	x			
Text	xx	xx	xx		
CBT	xx	xx	xx	x	x
IV	xx	xx	xx	x	xx

Source: Foshay 1985, 23.

A third, and final, factor Foshay states must be considered in choosing a medium is the ability of the medium to adapt to the learners needs. This factor is concerned with the ability of the medium to accommodate people who learn at different rates, the baseline knowledge of the students, and the potential for meeting the student's varying objectives (1985, 24). Table 3 depicts the medium to potential for adaptation match.

Table 3

Medium to Potential for Adaptation Match. Strong match represented by xx, moderate match by x and weak match by no mark.

POTENTIAL FOR ADAPTATION			
	Learning	Entry	Varying
MEDIUM	Rate	Level	objectives
Lecture			
Simulation			
Video or Film	x	x	
Text	x	x	x
CBT	xx	xx	xx
IV	xx	xx	xx

Source: Foshay 1985, 23.

While Foshay attempts to make a strong case for CBT and IV, his analysis suffers from the same weakness as Clark's--it is not specific to computer literacy training and, therefore, does not address the impact of computer anxiety.

The literature does provide numerous examples of how various mediums have been successful in training personnel. Lash reported how over 4,000 employees around the world were successfully trained on the Avis Wizard system using a combination of CBT and instructor led training. She stated that CBT enabled the entire corporation to come on-line at one time,

thereby negating the potential for learning decay. Learning decay is the process of forgetting learned material when there is no immediate opportunity for practice and use--"after four days, we forget about 90% of what we read, 80% of what we hear, 70% of what we see and 50% of what we see and hear (1986, 26-28). Plummer and Warnock-Matherton recorded how their hospital successfully trained a 1200 member nursing staff on a hospital information system using videotapes and audiocassettes (1987, 6-9).

Essentials of Training

Regardless of the source or medium used in training there are certain training essentials recommended in the literature that, when incorporated in the training, will assure an end product of computer literate employees.

Courses should consist of three phases according to Fretwell. The first phase, an overview, introduces the user to the system, emphasizes the benefits of the system and provides a broad description of the product. The second phase provides the actual information the user must possess to operate the system and the third phase, a summary, reemphasizes the key elements the user should have learned (1986, 28).

Lewis identifies several characteristics of training for overcoming computer anxiety. Among these are:

- a. "start with basics--"often the individual may not even know how to turn on the computer;

b. "demystify the computer--"training should ensure the user knows the different components of the system and basically how it works;

c. "take things slowly;"

d. learners should understand that they do not have to memorize everything and training should include practice in using the vendor provided product manual, and;

e. hands on training is essential (1988, 7-8).

Methodology

A literature review was conducted to identify current trends in training personnel to become computer literate. Alternatives for training were also identified as were the advantages and disadvantages of the alternatives.

In addition to a review of the literature, interviews were conducted with the Chief, Customer Support Branch, U.S. Army Health Care Systems Support Activity (HCSSA), the Chief, Ft. Shafter Information Center (IC), and the TAMC Information Management Officer (IMO) regarding the information center concept. The interviews were focused on advantages and disadvantages of information centers.

To identify the scope of training required, data specifying the current and projected types of hardware and software being used in the facility, and the job series of the users were obtained by surveying supervisors throughout the Medical Center. From this data, a matrix was constructed to illustrate the

software application usage density stratified by job series. The personnel turnover rate for each job series was computed based on data provided by the Civilian Personnel Office--Hawaii (CPOH) and the TAMC Resource Management Division. Application of the turnover rates to the matrix resulted in a projection of the annual computer literacy training requirement.

Based on information gathered through the literature review and analysis of the training requirement, the minimum proficiency level personnel should exhibit upon completion of training to demonstrate computer literacy was specified. The minimum required proficiency level was incorporated into the training requirement and concurrence with the training requirement was obtained from the Chief, IMD.

From analysis of the literature and a survey of the local Hawaii environment, alternatives to meet the training requirement were identified. This process identified training resources available, or potentially available within the community, their costs, advantages, and disadvantages. The TAMC Staff Judge Advocate was consulted to ensure actions taken during the course of alternative identification and analysis were in compliance with local, departmental, and federal law and regulations.

Based upon the identified costs, advantages and disadvantages, the alternative that best meets the needs of TAMC at the most reasonable price was recommended to the Chief of Staff. The Chief of Staff accepted the recommended solution as the alternative.

Discussion

Identification of Hardware and Software Density

A survey (Appendix B) was sent to the chiefs of each organizational elements within Tripler Army Medical Center and the Dental Activity. The chiefs were required to complete one survey for each civilian job series in their department, division, or office when personnel in that job series were required to use a microcomputer or minicomputer to successfully accomplish their duties. An additional survey was completed for all military personnel in the department, division, or office required to use microcomputers or minicomputers.

The survey was structured to determine the number of civilian personnel, by job series, and the number of military personnel who use each type of computer, the software products they use and the application used within the software product (word processing, spreadsheet, database management, etc). Chiefs were asked to identify not only the current requirements, but also future hardware and software requirements expected to be on hand by the end of fiscal year 1990.

Of the 38 organizational elements which were sent surveys, 36 responded, submitting 154 completed surveys. Fifteen of these surveys were discarded as invalid, following coordination with their preparers.

To facilitate analysis and reporting of the collected data, a database was created using the Enable software product.

Data from the surveys were input and a matrix was developed that stratified the user requirements by job series. Appendices C, D and E are the matrices for minicomputer users, IBM compatible microcomputer users and users of non-IBM compatible microcomputers, respectively.

Minimum Proficiency Levels

In order for a person to be computer literate he or she must be familiar with three aspects of his or her computer system: 1) the hardware; 2) the operating system, and; 3) the application software they must use. Unfamiliarity with any of these will prohibit the consistent, efficient accomplishment of duties. The exception to this statement is that users of minicomputers are normally not required to know operating system commands.

Based on experience and manufacturer's documentation, a list was developed outlining the capabilities and knowledge a computer literate person must possess. This list was staffed with the TAMC IMD and approved as the minimum proficiency level for computer literate individuals.

For a person to be hardware computer literate, he or she must be able to accomplish the tasks and understand the concepts or terminology identified in table 4. Note this is a generic list applicable to any user. If a specific user has special accessories such as light pens, laser video disk drives, Polaroid Palettes, etc., the user must also be familiar with the functions of these accessories.

Table 4

Minimum Proficiency Level--Hardware

-
1. Understand the functions of the following system components:
 - a. keyboard;
 - b. video display terminal;
 - c. printer;
 - d. bus interface unit (minicomputer users only);
 - e. central processing unit;
 - f. disk drives;
 - g. random access memory;
 - h. modem;
 - i. serial and parallel ports;
 2. Be able to accomplish the following tasks:
 - a. turn on all components;
 - b. troubleshoot component problems to the extent ensuring the problem component is plugged in, turned on and connected to the CPU;
 - c. insert disks in drives;
 - d. provide the system components with proper care and handling.
-

Table 5 lists the knowledge about the operating system that a computer literate person must possess and the tasks the person must be able to accomplish (Maran 1985, 3-23).

Table 5

Minimum Proficiency Level--Operating System

-
1. Computer literate persons understand the following:
 - a. management of directories on a hard disk;
 - b. purpose of the operating system;
 - c. external and internal commands;
 - d. file naming conventions;
 - d. the use of the * in file management;
 - f. the importance of backing up data;
 - g. basic configuration, including printer profile and commo ports.
 2. Be able to accomplish the following tasks:
 - a. boot the operating system;
 - b. format a disk;
 - c. manage directories, to include, making, changing, renaming and deleting;
 - d. manage files, to include, creating, naming, deleting, renaming, erasing, typing, backing up and copying.
 3. Be familiar enough with the user's manual look up commands.
-

There are hundreds of brands of application software available in the marketplace to computer users. To attempt to define the minimum essential proficiency level for each brand of software currently in use at TAMC would be both unfeasible and unnecessary. Definition of these levels is unnecessary from the

standpoint that many software packages accomplish the same function, e.g., Multimate and Word Perfect are both word processing applications. While the commands for each of these programs may be slightly different, their function and capabilities are similar. For this reason minimum proficiency levels were established based on the software application, not its brand name.

Proficiency levels were established for the most common applications, including, wordprocessing, spreadsheets and database management. Levels were not established for other applications because their functions are more focused, less commonly used and have self evident proficiency levels.

Regardless of the application software in use, there are certain proficiencies common to all. These are listed in Table 6. The minimum proficiency levels for word processing, spreadsheets and database management are provided in Tables 7 (Spezzano 1985, 112-138), 8 (Lotus 1986, 1.1-6.1) and 9 (Spezzano 1985, 297-336) respectively.

Table 6

Common Minimum Proficiency Level--Application Software

For any application the user must be able to:

- a. read and follow the user manual instructions;
 - b. boot the application;
 - c. access the menu (if available);
 - d. access the help function (if available);
 - e. create and name a file;
 - f. save the file;
 - g. use the user's manual to expand their knowledge and obtain answers to their questions;
 - h. exit the program.
-

Table 7Minimum Proficiency Level--Word Processing

Users will accomplish the following functions:

- a. create a document;
 - b. format a document, to include setting margins, line spacing and page length and width;
 - c. input text;
 - d. delete text;
 - e. edit text;
 - f. copy text, within and between documents;
 - g. move text, within and between documents;
 - h. insert page breaks;
 - i. search and replace text;
 - j. underline text and use other product features to enhance the document, e.g., bold type, subscripts and superscripts, etc.;
 - k. use the spell checker (if available);
 - l. print a document in both draft and final type.
-

Table 8

Minimum Proficiency Level--Spreadsheets

1. Users will accomplish the following functions:
 - a. create a worksheet;
 - b. efficiently move the cursor around the spreadsheet;
 - c. enter data and formulas, including formulas with relative and absolute cell addresses;
 - d. copy and move data and formulas;
 - e. erase data and formulas;
 - f. edit data and formulas;
 - g. protect cells;
 - h. change the recalculation method (manual to automatic and vice versa);
 - i. identify and name a range;
 - j. insert and delete columns or rows;
 - k. change column width;
 - l. graph data;
 - m. print a spreadsheet, range or graph;
 - n. print a graph;
 - o. create titles;
 - p. sort data;
 - q. modify alignment and format of data in cells, ranges;
 - r. use common @ Functions.
 2. Users will have been exposed to the capabilities of Macros
-

Table 9

Minimum Proficiency Level--Database Management

-
1. Users will accomplish the following functions:
 - a. design a database;
 - b. create a database shell with all fields properly defined;
 - c. input records;
 - d. edit records;
 - e. delete records;
 - f. index records;
 - g. sort records;
 - h. specify conditions for record searches and selection;
 - i. use wild cards to search for records;
 - j. create a custom input screen;
 - k. create a custom report;
 - l. print a report.
 2. Users will have been exposed to the systems procedural language and system query language (if applicable).
-

Employee Turnover Rate

Civilian employee turnover computations were based on data from two sources. The first source was the TAMC Resource Management Division which provided a listing of civilian personnel authorizations by job series as of 1 October 1988.

The second source of data was the Civilian Personnel Office--Hawaii (CPOH), which provided a report based on data extracted from the Standardized Civilian Personnel Management Information System. The report indicated the number of employees entering position titles in each job series during calendar year 1987. This information was also provided for calendar year 1988. The major problem with this report was that for any given position, only the most recent entry during the year was counted; if personnel in a given position turned over more than once during the year, the number in excess of one was not captured. This factor was not considered overly significant as few duty positions turn over more than once per year, however, to the degree it did happen the personnel turnover rate is underestimated.

A second problem encountered was the lack of turnover in some low density job series when only one year's data were used. To better accommodate for this condition two years of data were used, 1987 and 1988.

Turnover was computed by dividing the average number of position entries per year, in each job series, during 1987 and 1988 by the number of authorizations for that job series. The resulting turnover rate for each job series is displayed in Appendix F.

The annual turnover rate used for military personnel was 0.25 per year, as Hawaii is a four year tour. While some military personnel are assigned to the hospital for less four years, others extend beyond four years and, according to COL

Dennis Walchek, Assistant Chief Nurse, all nurses stay for four years, and nursing is the military group with the largest number of computer users.

Specification of Training Requirement

The annual training requirement is the number of personnel requiring computer literacy training each year. It was computed for each software program by multiplying the number of users of the program in a job series by the turnover rate for that job series, then summing the product for all job series. The monthly training requirement is simply one-twelfth of the annual requirement.

Tables 10, 11 and 12 delineate the training requirement for minicomputers, IBM compatible microcomputers and non-IBM microcomputers, respectively. Software programs determined to have an annual training requirement of less than one person were considered insignificant and not included in the tables.

Table 10

Annual and Monthly Training Requirement--Minicomputers

	Annual	Monthly
Wang Minicomputer		
Word Processing	35	2.9
Sperry Minicomputer		
Word Processing	18	1.5
Database Management	14	1.2
Spreadsheet	12	1.0
Electronic Mail	10	0.8
Telecommunications	7	0.6
Intel 310 Minicomputer		
Word Processing	13	1.1
Database Management	9	0.8
Spreadsheet	8	0.7
Electronic Mail	9	0.8
Telecommunications	7	0.6

Table 11

Annual and Monthly Training Requirement--IBM Compatible
Microcomputers

	Annual	Monthly
Introduction to Micro-		
computers and DOS	165	13.8
Word Processing Programs		
Multimate	38	3.2
Word Perfect	22	1.8
Wang IWP	5	0.4
Microsoft Word	2	0.2
Displaywrite III	1	0.1
Wordstar	1	0.1
WPS-Plus	1	0.1
Database Management Programs		
dBase III	45	3.8
dBase IV	2	0.2
PC Focus	3	0.3
Spreadsheet Programs		
Lotus 1-2-3	42	3.5
Supercalc	5	0.4
Visicalc	5	0.4

Table 11 (Continued)

Annual and Monthly Training Requirement--IBM Compatible
Microcomputers

	Annual	Monthly
Integrated Programs		
Enable	78	6.5
Symphony	5	0.4
Framework	5	0.4
Communications Programs		
Procomm	11	0.9
Cross Talk	12	1.0
PCU	2	0.2
Miscellaneous Programs		
Harvard Graphics	15	1.3
MS Windows	10	0.8
Time Line	5	0.4
News Master	5	0.4
Print Master	2	0.2
Word Perfect Library	2	0.2
SPSS	1	0.1
Print Q	1	0.1
Sideways	1	0.1

Table 12

Annual and Monthly Training Requirement--Non-IBM Compatible
Microcomputers

	Annual	Monthly
MacIntosh SE		
Mac Link	6	0.5
Word Processing	6	0.5
Spreadsheet	6	0.5
Graphics	6	0.5
MacIntosh		
MS Word	2	0.2
MS Excell	1	0.1

Identification of Training Alternatives

Three basic alternatives were identified for training: 1) in-house training; 2) training from sources external to TAMC, and; 3) a combination of in-house and external training.

For each of these alternatives, numerous sub-alternatives were identified for meeting the training needs. The training medium is the source of alternatives for in-house training. Among the alternatives available are: video tape instruction, interactive video (IV) disk instruction, instructor led instruction or a combination of media. Alternatives for

externally provided training are differentiated by the various entities who can provide the training, rather than the training medium. Sources of external training include government organizations, commercial organizations and educational institutions.

Three governmental organizations were identified as alternative sources of training, including: the Information Center (IC), 1116th Signal Battalion, under the operational control of Western Command (also referred to as the Ft. Shafter IC); Civilian Personnel Office--Hawaii (CPOH), and the Naval Regional Data Automation Center (NARDAC), Pearl Harbor.

Numerous commercial enterprises provide computer literacy training. Among these are several computer stores and consulting firms (GTE Hawaiian Tel 1989, 365-84). A letter (example at Appendix G) was sent to a sample of 10 computer stores and consultants. Responses to the letter were received from four vendors and the analysis of this alternative was based on these responses.

A survey of catalogs from local educational institutions revealed three sources of computer literacy training, including: Kapiolani Community College; Honolulu Community College, and; Roosevelt University.

Training for virtually all high density software programs in TAMC is available from sources external to TAMC. Appendix H depicts the availability and sources of computer literacy courses.

Analysis of Alternatives

Coppolino wrote, "PC user training incorporates three important objectives: properly trained users, cost-effective and timely training, and convenience" (59). He goes on to point out that the medium used to train and the source are "merely questions of means, not ends" (59). Coppolino's objectives became the criteria against which external sources were evaluated. Because Tripler is not currently providing training which meets the criteria, as defined below, inhouse training was evaluated on the cost of resources required to enable Tripler to provide training that meet the criteria.

A properly trained user is a user, who, upon completion of training, can accomplish requirements established in the minimum proficiency level tables. Based on the literature review and personal interviews, two factors must be present for a high probability of minimum proficiency level achievement: 1) a person to provide training or assist the trainee when another medium is being used, and; 2) hands-on training with the hardware and software. Information provided by all external sources indicated their training objectives and methodologies will satisfactorily meet these criteria and produce properly trained users. For TAMC to properly train users, hiring of at least one employee, or restructuring the duties of at least one current employee to support training is necessary.

The timeliness of training is an important cost and morale factor when the training is required for performance of duties.

The longer a person must wait to be trained the longer it will take for that person to be able to accomplish his or her assigned duties efficiently, thereby decreasing productivity and increasing costs. Assuming the new employee wants to accomplish his or her job efficiently, the longer he or she must wait for training, the more frustrated he or she will become with the job and morale will suffer. Additionally, the inability or unwillingness of management to provide the new employee with the training necessary to efficiently accomplish his or her job may make the employee feel less valuable to the organization, again lowering morale. Obviously, the ideal situation is to train personnel as soon as they report for duty. The further away training gets from the report date the less acceptable the alternative. For purposes of this effort, training alternatives were considered acceptably timely if training is available within the initial two months of employment, highly satisfactory if available within the first month, and unsatisfactory if not available within two months.

Of the external sources of training, commercial firms and educational institutions consistently offer courses in the highly satisfactory timeframe. Educational institutions, however, require advance registration and payment, thereby increasing the lead time required to get an individual enrolled and reducing the timeliness to less than highly satisfactory, but still acceptable.

Timeliness of the IC and CPOH are unsatisfactory. The IC determines when a course will be offered based on IC employee's

perception of need, and as the Chief of the IC commented, ICs are not very responsive (Sonoda 1989). CPOH is unsatisfactory for two reasons. The first reason, according to Ms. Jean Nakatsukasa, CPOH Employee Development Specialist, is that CPOH schedules courses based on the need identified by supervisors and approved for funding by TAMC's Civilian Training Committee. Supervisors concern themselves with the training needs of current employees and prioritize their needs as such; the need based on potential turnover is either not identified, or is given a low priority. According to Colonel George Kernan, Chairman of the Training Committee, training for computer courses is generally prioritized very low as this need is competing against the need for continuing medical education training needs; therefore, computer training can rarely be funded from the training budget--\$30,000 in fiscal year 1989. The result is few courses scheduled by CPOH. The second reason CPOH timeliness is unsatisfactory is that it does not accommodate the training requirement for military personnel, again creating an understatement of the need and inadequate scheduling of courses.

NARDAC's timeliness is highly satisfactory for introductory courses in microcomputers, DOS and Word Perfect, however all other applications they support are scheduled for training only once per quarter, i.e., unsatisfactory (Navy Regional Data Automation Center--Pearl Harbor 1989, 4).

Convenience was defined as the ease of access the user has to the training. Specific considerations were the time and

location of training and any flexibility offered. Most commercial firms were found to be relatively inconvenient. They are either located in downtown Honolulu with its inherent traffic and parking problems, or a significant distance from TAMC. However, most commercial firms do offer to provide training within TAMC, and in some instances the cost for this convenience is lower than training provided at the vendor's location. For example, according to Ms. Amy Kerley, account executive for Computer Training Institute, scheduled courses at their location are offered at a rate of \$98 per student per eight hour course; the firm offers to provide training at the user's workplace at a flat rate of \$45 per hour or \$360 per eight hour course. For this option to be cost-effective, an average of 3.7 users must be trained in each session. As seen previously in table 11, the monthly training requirement for introduction to microcomputers and DOS, dBase III and Enable all exceed 3.7, while Lotus 1-2-3 almost meets the criteria, having a monthly training requirement of 3.5.

Courses offered by educational institutions are somewhat inconvenient as they are normally night classes.

Courses offered by government sources are considered fairly convenient as they are offered on nearby installations during duty hours, and according to Senior Chief Petty Officer Barbara Kjer of NARDAC, they will provide training at TAMC for \$460 per day.

Based on the above factors a cost analysis of external sources was performed to determine the least costly alternative

for providing training that produces properly trained users, and is conducted within an acceptable timeframe. Convenience was considered only when all other factors, including cost, were equal. As detailed in Appendix I, the minimum annual cost for using external sources to meet TAMC's annual computer literacy training requirement is \$98,558.

Analysis of the in-house training alternative focused on the various media available to provide training that will produce properly trained users in a highly satisfactory timeframe, and the costs associated with these media. Three media were evaluated, including: 1) interactive video (IV); 2) video tape or CBT, and; 3) instructor led training.

As discussed in the literature review, any of these media are satisfactory methods for transferring knowledge to users, provided the structure of the material is good, hands-on training is accommodated, the training is removed from the employee's work area and a knowledgeable person is present to assist and answer questions. The availability of a human during introductory level training is critical as this is when a person's computer anxiety is highest.

As shown in Appendix J, both IV and video tape products are available to support training in all of TAMC's high density microcomputer applications, however, no courseware is available to support minicomputer training nor training for low density and specialized application programs.

An additional barrier to the production of properly trained users with in-house training is the absence of a satisfactory

training location, i.e., removed from the work area. This barrier to training is being removed for microcomputers with the preparation for implementation of CHCS. To support this implementation, 17 training rooms were created, each room with the capacity for 10 students. According to MAJ Doug Mills of the CHCS Project Office, CHCS training will rarely require the use of all of these rooms and the project office will allow IMD to utilize one room for microcomputer training. The use of this room to support minicomputer training requires the installation of three separate terminals and their connection to a CPU. This presents the issue of efficient use of resources since the projected monthly training requirement for each system is one.

Analysis of media in terms of timeliness of training reveals that timeliness is a function of the resources TAMC is willing to invest. Each month TAMC must provide access to 188.2 hours of training with IV or video tape in order to meet the needs of new employees with a requirement to use microcomputers (Appendix K). Since an average month has approximately 166 duty hours and assuming access to the training will only be during duty hours, sufficient equipment must be available to support the training of at least two individuals at once, i.e., two laser disk readers, with accessories, two video tape players with TVs or one IV setup and one video tape setup. Any alternative requires two microcomputers and one employee to provide assistance and answer questions. Note that with two setups and assuming efficient scheduling, the employee time required for assistance is reduced by half to approximately 99

hours per month. This leaves about 67 manhours per month for the employee to devote to other training needs such as minicomputer training. Three setups will require 63 hours of employee time for assistance leaving 103 manhours for the provision of other training. As indicated in Appendix I, the manhours required to provide instructor led training, based on instructor time identified by the preferred external source, is 243 hours per month. The use of IV disks will only reduce this requirement to 135 hours per month since not all training needs are met by available courseware. The use of video tape will only reduce the requirement for instructor led training to 139 hours per month. In order to have sufficient manhours to accomodate instructor led training requirements an additional employee is required or a minimum of seven equipment setups must be available. With seven setups, all IV, video tape and CBT training can be provided within 27 hours per month, leaving 139 manhours for instructor led training.

A derivation of maximum use of electronic media is the use of an instructor to present courses when the monthly training hours required to train new employees in a particular application via IV or video tape is greater than the hours required to provide the training with an instructor. For example, introductory training to microcomputers and DOS requires 110 hours of employee presence if an electronic medium is used (Appendix K), however, if instructor led training is provided only 32 hours of employee time is required (Appendix I). Modification of data in the preceding paragraph to

accomodate a change from electronic media to instructor led training reduces the required access time to electronic media to 78.2 hours and increases instructor led time requirements to approximately 170 manhours. A particular advantage of this derivation is that it accomodates reduction of computer anxiety at the initial stages of computer literacy training.

To determine the resources necessary to ensure timely instruction using instructor led training only, the instructor time identified by preferred external source was used. This time, as specified in Appendix I, is 243 manhours per month. According to Mr. Steve Koelle, Chief, Customer Support Branch, HCSSA, instruction time should be increased by a factor of 0.20 to accomodate instructor and lesson preparation. Adding this factor equates to a monthly manhour requirement of 292 hours or 1.75 personnel.

The convenience of in-house training is obvious, as the employee need not leave TAMC to obtain the training, however, when evaluating the convenience of in-house alternatives, the IV or video tape are superior. The reason for this is that personnel have greater flexibility and control over when they access the training courseware. Because a different course can be taught on each equipment setup and each setup is operated simultaneously, a user's flexibility is only limited by availability of equipment and courseware. This flexibility can have a direct impact on timliness as users do not have to wait for courses to be scheduled, they can schedule their own. Note that the more setups available to increase instructor time for

devotion to instructor led training, the less time the user has available to access the other media, therefore reducing flexibility.

The cost associated with different media varies significantly. According to Ms. Cheryl Sinclair of Applied Learning, each laser disk setup currently costs \$5000, not including the cost of the microcomputer (since TAMC currently has microcomputers available for training, their cost is not considered). Additionally, she indicates the IV disks can only be leased with an annual cost to TAMC of approximately \$16,000. According to Captain Gerald Hepler, Chief, Manpower Branch, the annual cost of a GS07 employee (the typical grade for a trainer) to provide assistance, answer questions and train non-IV supported training is \$29,484; therefore, the total annual recurring cost to use this medium is approximately \$45,000. The non-recurring cost for two equipment setups, is \$10,000, for seven setups it is \$35,000.

The cost to provide training via video tape is significantly less as some equipment setups and much courseware is already available within TAMC. The only recurring cost is for one employee to provide assistance and additional training--\$29,484. The cost to procure additional equipment setups, specifically, VCRs and TVs is approximately \$1000 per setup providing standard one-half inch VHS format tape players are procured. Staff Sergeant Nichols, Chief, Audio-Visual Section, IMD, stated she could provide one standard VCR and one three-quarter inch VCR on a full time basis for microcomputer training upon receipt of

some new equipment in July 1989. The cost to procure an additional five setups is approximately \$5,000.

The cost for instructor led training is simply the annual wage multiplied by the number of instructors, i.e., \$29,484 times 1.75, or \$51597. This is a recurring cost.

Two factors must be considered when evaluating the above alternatives. The first factor is that four personnel authorizations are available for CHCS trainers, two of these have been filled. According to Major Doug Mills of the CHCS project office, approximately 20% of these employee's time may be available to assist with microcomputer or minicomputer training. This equates to a 0.8 full time equivalent (FTE). Unfortunately, because CHCS trainer priorities must go to CHCS, scheduling problems may make dependence on this resource unacceptable. The second factor to consider is that the person providing assistance and answering questions to users of IV or video tape media will not be fully utilized in that capacity. While the individual needs to be present, nothing precludes that employee from having additional responsibilities, indeed the relocation of a current employee and his or her current duties to the training area would probably fill the need, provided the employee is adequately trained on the application software being trained via courseware. The job position, currently in the Customer Support Branch, that is the most functionally related to filling this need is the courseware librarian.

One problem exists for providing sufficient staff to accomplish in-house training. TAMC, and specifically the IMD has no personnel authorizations for trainers. Ms. Thelma Reisch of the Manpower Branch stated that overhires, if applied against requirements with no authorizations is a viable solution. She further stated that IMD has requirements against which overhires could be brought on board. She also stated that IMD has sufficient civilian pay funds to accomodate overhires.

One issue which has not been addressed is the need for training personnel in the use of software applications for which no external or in-house source currently exists. These applications all have a low usage density and many accomplish very uncomplicated functions requiring little or no training. Other software supporting wordprocessing, spreadsheets, database management or a combination of these applications, does require training support. The question is: should TAMC provide this training? Swider states that one of the pitfalls of implementing an information center is the "lack of standardization on product selection." Failure to standardize initially results in the requirement to support a wide range of products later, creating a staff which "will at best be semi-skilled in a wide range of products but proficient in none" (1988, 27). Lawton stated that the minimum time to develop an introductory course is one week, equating to an employee cost of approximately \$570. This cost is higher than the cost to replace the software with a standard package, and

if the software change occurs as personnel turnover, additional training costs are avoided.

Conclusion and Recommendations

Conclusion

The purpose of this study was to determine the most effective method of providing computer literacy training to new employees at Tripler Army Medical Center.

Based on identification of the training requirement and analysis of alternatives in terms of producing properly trained users in a timely manner with consideration given to convenience and cost, in-house training is the best solution. In-house training will ensure new employees are properly trained to achieve minimum proficiency levels; the training can be provided in a highly satisfactory time frame, providing the greatest convenience to the user and the lowest cost. A cost comparison between external sources and in-house training reveals that training from external sources will cost TAMC approximately \$98,600 annually, while the most costly in-house alternative--IV medium with seven setups and one employee has a first year cost of approximately \$80,500 and recurring costs of about \$45,500. The lowest feasible cost for in-house training, provided current employees are not utilized, is \$34,500. This cost is based on the use of currently available video tape courseware, the procurement of five VCR/TV equipment setups, and the hiring of one employee.

The lowest cost in-house alternative, as just described, is not the most effective method of training users as it does not

adequately address new user's computer anxiety. The best solution is the provision of instructor led training for introductory courses in microcomputers and DOS, use of video tape training for all software applications having courseware available, and instructor led training for applications with no supporting courseware. This solution requires 170 hours of instructor led training time each month, plus 34 hours of preparation time and 78 hours of employee time to support assistance requirements for the video tape and CBT training. Total manhours required for this option is 282 hours per month or 1.7 FTE. If two new employees are hired to meet this manpower need the cost is approximately \$59,000 per year, however, by maximizing the application of current manpower, the new personnel requirement can be reduced to one, for a cost of \$29,484.

Recommendations

To facilitate implementation of the most effective solution for computer literacy training the following recommendations are provided:

- a. convert one of the CHCS training rooms to support microcomputer training, equipping the room with at least four microcomputers (this will support training of up to eight personnel at one time) and two video tape player setups;
- b. physically relocate the courseware library and librarian to the training room;

c. modify the librarian's job description incorporating microcomputer training;

d. provide sufficient microcomputer training and instructor training to the librarian to ensure he or she can accomplish the expanded duties;

e. hire one employee to train applications not supported by video tape or CBT;

f. provide minicomputer training at the user's work site;

g. use CHCS trainers, when possible, to provide training above the introductory level, and;

h. develop a list of standard software for TAMC, have it approved by the Information Management Guidance Council, and provide training support only for these approved software packages.

APPENDIX A--DEFINITIONS

Computer Anxiety--the fear of using computers and avoidance behavior (Cambre and Cook 1987, 15).

Computer Literate--The ability to perform at the defined minimum proficiency level specified for a specific software application.

Effective (as used in the problem statement)--best meets the training requirement, cost and other factors considered.

Minimum Proficiency Level--The degree of expertise an individual must demonstrate, upon completion of training, in order to be considered literate.

New Employee--Any person hired to fill a vacancy within the medical center.

Usage Density--The number of personnel within the facility utilizing a particular software application package.

APPENDIX B. SUPERVISOR SURVEY

S: 1 May 1989

HSBK-DCA-A (1)

3 April 1989

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Computer Training for New Employees

1. Complete the enclosed survey and return it to me by 1 May 1989.
2. The purpose of the survey is to obtain necessary information to forecast the automation training requirement for new employees. One copy of the survey must be completed for each civilian job series where the use of a computer is a job requirement--the requirement need not be delineated in the job description. One additional survey must be completed encompassing data for all military personnel who use a computer in their job.
3. Do not incorporate actual or anticipated requirements to use CHCS or other Tri-Service systems in meeting job requirements. Training resources for CHCS have already been programmed and are available, while most other Tri-Service systems are being replaced.
4. This survey must be filled out completely and accurately to ensure we implement a training program which accomodates the true and complete training requirement of TAMC.
5. Address any questions to the Administrative Resident, MAJ Mike Daley, at telephone number 433-6439 or digital beeper number 288-8926.

Encl

RICHARD E. MEIERS
COL, MS
Chief of Staff

DISTRIBUTION:
B

COMPUTER USEAGE SURVEY

1. NAME OF DEPARTMENT, DIVISION, SEPARATE SERVICE, OR STAFF OFFICE: _____
2. JOB SERIES (IF MILITARY, SO STATE): _____
COMPLETE ONE SURVEY FOR EACH CIVILIAN JOB SERIES WITH A REQUIREMENT TO USE COMPUTERS AND ONE SURVEY FOR ALL MILITARY WHO USE COMPUTERS.
3. NUMBER OF PERSONNEL IN THIS JOB SERIES WITH A JOB REQUIREMENT TO UTILIZE COMPUTERS AND SOFTWARE: _____
(The requirement need not be stated in the job description).
4. HARDWARE AND SOFTWARE UTILIZATION. For each system type identified below, enter the number of personnel identified in question 3 who have a requirement to use this system software. The hardware and software need not be on hand at present for a requirement to exist, however, do not include the requirement if the hardware and software are projected for procurement after the end of FY 90.

NOTE: COMPLETE THIS SURVEY BASED ON THE SOFTWARE USED (OR PROJECTED FOR USE) NOT ON THE SOFTWARE YOU HAVE AVAILABLE.

- a. TERMINAL CONNECTED TO WANG MINICOMPUTER (if the terminal has stand alone capabilities to function as a microcomputer, and this capability is used, complete question 4.d. also).

APPLICATION	# OF USERS
WORD PROCESSING	_____
DATABASE MANAGEMENT	_____

- b. TERMINAL CONNECTED TO SPERRY SYSTEM (if the terminal has stand alone capabilities to function as a microcomputer, and this capability is used, complete question 4.d. also).

APPLICATION	# OF USERS
E-MAIL	_____
WORD PROCESSING	_____
SPREADSHEET	_____
DATABASE MANAGEMENT	_____
TELECOMMUNICATIONS	_____

- c. TERMINAL CONNECTED TO INTEL 310 SYSTEM (if the terminal has stand alone capabilities to function as a microcomputer, and this capability is used, complete question 4.d. also).

APPLICATION	# OF USERS
E-MAIL	_____
WORD PROCESSING	_____
SPREADSHEET	_____
DATABASE MANAGEMENT	_____
TELECOMMUNICATIONS	_____

- d. IBM COMPATIBLE MICROCOMPUTER (i.e., MS-DOS Operating System).

APPLICATION	NO. OF USERS
WORD PROCESSING	
1) MULTIMATE	_____
2) WORD PERFECT	_____
3) OTHER PROGRAMS (LIST)	_____
_____	_____
_____	_____

INTEGRATED SOFTWARE

- 4) ENABLE (TOTAL # OF USERS)

a) WORD PROCESSING	_____
b) SPREADSHEET	_____
c) DATABASE MANAGEMENT	_____
d) GRAPHICS	_____
e) TELECOMMUNICATIONS	_____

- 5) SYMPHONY (TOTAL # OF USERS)

a) WORD PROCESSING	_____
b) SPREADSHEET	_____
c) DATABASE MANAGEMENT	_____
d) GRAPHICS	_____
e) TELECOMMUNICATIONS	_____

- 6) FRAMEWORK (TOTAL # OF USERS)

a) WORD PROCESSING	_____
b) SPREADSHEET	_____
c) DATABASE MANAGEMENT	_____
d) GRAPHICS	_____
e) TELECOMMUNICATIONS	_____

APPLICATION	NO. OF USERS	Daley #
<u>DATABASE MANAGERS</u>		
7) dBASE III	_____	_____
8) OTHER PROGRAMS (LIST)	_____	_____
_____	_____	_____
_____	_____	_____
<u>SPREADSHEETS</u>		
9) LOTUS 1-2-3	_____	_____
10) VISICALC	_____	_____
11) SUPERCALC	_____	_____
12) OTHER PROGRAMS (LIST)	_____	_____
_____	_____	_____
_____	_____	_____
<u>COMMUNICATIONS</u>		
13) PROCOM	_____	_____
14) CROSSTALK	_____	_____
15) OTHER PROGRAMS (LIST)	_____	_____
_____	_____	_____
_____	_____	_____
<u>MISCELLANEOUS PROGRAMS</u>		
16) MS WINDOWS	_____	_____
17) HARVARD GRAPHICS	_____	_____
18) TIMELINE	_____	_____
19) NEWSMASTER	_____	_____
20) OTHER PROGRAMS (LIST)	_____	_____
_____	_____	_____
_____	_____	_____

e. MICROCOMPUTERS NOT IBM COMPATIBLE (OPERATING SYSTEM
OTHER THAN MS-DOS), E.G., APPLE

BRAND OF MICROCOMPUTER	OPERATING SYSTEM	APPLICATION SOFTWARE USED
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

APPENDIX C.
ANALYSIS OF SOFTWARE USAGE REQUIREMENTS
BY JOB SERIES

JOB	WANG	SPERRY					INTEL 310				
SERIES	WP	E-MAIL	WP	SS	DB	T	E-MAIL	WP	SS	DB	T
00018	0	1	1	0	1	1	0	0	0	0	0
00180	1	0	1	0	1	0	0	0	0	0	0
00185	1	1	1	1	1	1	0	0	0	0	0
00301	0	1	1	0	0	1	0	0	0	0	0
00303	2	3	5	2	2	1	0	0	0	0	0
00318	26	13	14	6	4	7	7	7	7	7	1
00322	11	3	3	1	1	0	2	2	2	2	2
00334	0	7	7	5	4	6	1	1	0	1	0
00335	0	1	1	0	1	1	0	0	0	0	0
00344	0	2	2	2	0	0	0	0	0	0	0
00393	0	1	1	1	1	1	0	0	0	0	0
00525	0	1	0	5	5	0	0	0	0	0	0
00530	0	0	2	0	2	0	0	0	0	0	0
00610	10	0	0	0	0	0	0	0	0	0	0
00620	2	0	0	0	0	0	0	0	0	0	0
00647	4	0	0	0	0	0	0	0	0	0	0
00648	1	0	0	0	0	0	0	0	0	0	0
00671	0	1	1	1	1	0	1	1	1	1	0
00675	2	1	6	6	6	1	0	0	0	0	0
00679	16	0	0	0	0	0	0	0	0	0	0

JOB	WANG	SPERRY					INTEL 310				
SERIES	WP	E-MAIL	WP	SS	DB	T	E-MAIL	WP	SS	DB	T
00962	1	3	3	3	3	3	0	0	0	0	0
00967	5	0	0	0	0	0	0	0	0	0	0
01035	1	1	1	0	0	1	0	0	0	0	0
01531	0	0	0	2	0	0	0	0	0	0	0
02005	0	0	0	0	0	0	9	9	3	2	0
MIL	85	51	75	42	57	31	35	51	38	41	33

APPENDIX D.
ANALYSIS OF SOFTWARE USAGE REQUIREMENTS
BY JOB SERIES

IBM COMPATIBLE MICROCOMPUTERS

JOB		ENABLE				SYMPHONY				
SERIES	WP	SS	DB	GR	T	WP	SS	DB	GR	T
00018	1	1	1	1	1	0	0	0	0	0
00080	1	1	1	1	1	0	0	0	0	0
00085	4	4	4	4	4	0	0	0	0	0
00218	1	1	1	1	1	0	0	0	0	0
00303	1	1	1	1	0	0	0	0	0	0
00318	19	19	17	9	5	0	0	0	0	0
00322	1	1	1	1	1	0	0	0	0	0
00343	4	4	0	0	2	0	0	0	0	0
00344	0	0	0	1	0	0	0	0	0	0
00345	2	1	1	0	0	0	0	0	0	0
00413	0	0	0	0	0	1	1	1	1	1
00525	5	5	0	5	0	0	0	0	0	0
00530	2	0	2	0	0	0	0	0	0	0
00560	1	0	0	0	0	0	0	0	0	0
00561	1	0	0	0	0	0	0	0	0	0
00602	1	0	1	0	0	0	0	0	0	0
00610	65	65	65	65	60	0	0	0	0	0
00620	14	14	14	14	14	0	0	0	0	0
00621	4	4	4	4	4	0	0	0	0	0

JOB						SYMPHONY				
ENABLE										
SERIES	WP	SS	DB	GR	T	WP	SS	DB	GR	T
00642	4	2	1	1	0	0	0	0	0	0
00644	0	0	0	0	0	2	2	2	2	0
00647	5	5	5	0	0	0	0	0	0	0
00648	1	0	0	0	0	0	0	0	0	0
00671	1	1	1	0	0	0	0	0	0	0
00675	1	1	1	1	1	0	0	0	0	0
00679	33	33	31	22	17	0	0	0	0	0
00699	11	0	0	0	0	0	0	0	0	0
00802	1	1	1	1	1	0	0	0	0	0
00962	1	1	3	3	1	0	0	0	0	0
01306	1	1	1	1	0	0	0	0	0	0
MIL	253	243	216	186	180	24	24	24	23	21

JOB						WORD PROCESSORS		DATA BASE MGRS.	
FRAMEWORK						MULTI- MATE	WORD PERFECT	dBASE	
SERIES	WP	SS	DB	GR	T			III,+,IV	
00018	0	0	0	0	0	0	1	0	
00080	0	0	0	0	0	1	1	1	
00085	0	0	0	0	0	4	0	0	
00086	0	0	0	0	0	0	1	1	
00180	0	0	0	0	0	1	4	1	
00185	0	0	0	0	0	2	0	2	
00186	0	0	0	0	0	3	0	3	
00204	0	0	0	0	0	0	7	7	
00218	0	0	0	0	0	1	0	0	

JOB SERIES	FRAMEWORK					WORD PROCESSORS		DATA BASE MGRS.
	WP	SS	DB	GR	T	MULTI- MATE	WORD PERFECT	dBASE III,+,IV
00303	0	0	0	0	0	0	2	4
00305	0	0	0	0	0	0	0	1
00310	0	0	0	0	0	1	1	0
00318	1	1	1	1	0	22	10	15
00322	0	0	0	0	0	9	1	6
00334	0	0	0	0	0	2	1	7
00343	0	0	0	0	0	0	1	4
00344	0	0	0	0	0	0	0	1
00345	0	0	0	0	0	0	2	2
00404	0	0	0	0	0	0	1	0
00413	0	0	0	0	0	0	1	0
00501	0	0	0	0	0	0	0	1
00511	0	0	0	0	0	3	0	3
00525	0	0	0	0	0	0	0	5
00560	0	0	0	0	0	0	0	1
00561	0	0	0	0	0	0	1	3
00602	0	0	0	0	0	1	1	1
00610	0	0	0	0	0	14	10	20
00620	0	0	0	0	0	3	2	1
00631	0	0	0	0	0	1	0	1
00642	0	0	0	0	0	0	0	1
00644	0	0	0	0	0	1	2	2
00649	0	0	0	0	0	1	0	1
00651	0	0	0	0	0	1	0	0

JOB SERIES	FRAMEWORK					WORD PROCESSORS		DATA BASE MGRS.
	WP	SS	DB	GR	T	MULTI- MATE	WORD PERFECT	dBASE III,+,IV
00675	0	0	0	0	0	0	2	20
00679	0	0	0	0	0	12	15	12
00699	0	0	0	0	0	0	0	11
00802	0	0	0	0	0	0	1	0
00962	0	0	0	0	0	3	3	3
00967	0	0	0	0	0	0	0	1
01306	0	0	0	0	0	0	1	1
01410	0	0	0	0	0	2	0	2
01411	0	0	0	0	0	2	0	2
01531	0	0	0	0	0	2	2	2
02005	1	1	1	1	0	1	1	1
MIL	25	25	25	25	20	150	88	143

JOB SER.	SPREADSHEETS			MISCELLANEOUS					
	LOTUS 1-2-3	VISI- CALC	SUPER- CALC	MS WINDOWS	HARVARD GRAPHICS	TIME- LINE	NEWS MASTER	PRO- COMM	CROSS TALK
00018	0	0	0	1	1	1	0	1	0
00080	0	0	0	1	1	1	0	0	0
00085	0	0	0	4	4	0	0	0	0
00086	0	0	0	0	0	0	0	0	0
00180	1	0	0	1	4	1	0	0	0
00185	1	0	0	0	0	0	0	0	0
00186	2	0	0	3	1	0	0	0	0
00204	7	0	0	2	7	0	0	0	7

JOB SER.	SPREADSHEETS			MISCELLANEOUS					
	LOTUS 1-2-3	VISI- CALC	SUPER- CALC	MS WINDOWS	HARVARD GRAPHICS	TIME- LINE	NEWS MASTER	PRO- COMM	ROSS TALK
00218	0	0	0	1	1	1	0	0	0
00318	18	0	0	3	3	0	1	3	2
00322	3	0	0	0	1	0	1	0	1
00334	8	0	0	2	0	1	0	7	2
00335	0	0	0	0	0	0	0	1	0
00343	6	0	0	0	2	0	0	4	0
00344	1	0	0	0	0	0	0	0	0
00345	2	0	0	0	2	0	0	2	0
00404	1	0	0	0	1	0	0	0	0
00413	1	0	0	1	0	0	0	0	0
00501	1	0	0	0	0	0	0	0	0
00511	3	0	0	3	0	0	0	3	0
00560	1	0	0	0	0	0	0	0	0
00561	3	0	0	0	0	0	0	1	0
00602	1	0	0	1	0	0	0	0	0
00610	19	0	0	0	0	0	0	0	0
00620	1	0	0	0	0	0	0	0	0
00631	0	0	0	1	0	0	0	0	0
00644	2	1	1	0	2	0	1	0	0
00649	1	0	0	0	1	0	0	0	0
00675	2	0	0	0	0	0	0	0	0
00679	12	0	0	0	0	0	0	0	0
00802	1	0	0	0	0	0	0	0	1
00962	3	0	0	0	0	0	0	0	0

JOB SER.	SPREADSHEETS			MISCELLANEOUS					
	LOTUS 1-2-3	VISI- CALC	SUPER- CALC	MS WINDOWS	HARVARD GRAPHICS	TIME- LINE	NEWS MASTER	PRO- COMM	CROSS TALK
00967	0	0	0	0	0	0	0	0	1
01410	0	0	0	2	0	0	0	2	0
01411	0	0	0	2	0	0	0	2	0
01531	2	0	0	0	0	0	0	0	0
02005	0	0	0	1	1	0	0	1	0
MIL	155	21	21	46	63	20	21	43	48

Software Identified in Survey
as "Other Program" Requirements

Job Series	Word Processing Program	# of Users
00318	Generic Way	1
	WPS Plus	3
	Microsoft Word	1
	Wang IWP	5
	Displaywrite III	1
00322	Microsoft Word	1
	Displaywrite III	1
00334	Wang IWP	2
00413	Displaywrite III	1
00499	Wang IWP	1
00610	Wang IWP	3
00620	Wang IWP	2
00644	Wordstar	2

Job Series	Word Processing Program	# of Users
00690	Wang IWP	3
02030	Wang IWP	1
MIL	Wordstar	5
	Microsoft Word	7
	WPS-Plus	2
	Displaywrite III	3
	Wang IWP	10

Job Series	Database Program	# of Users
00180	dBase IV	2
	SPSS	2
00318	A-Z	3
	dBase IV	2
	PC Focus	3
00334	PC Progress	1
	Clipper	1
00610	PC Focus	3
00620	PC Focus	1
00690	PC Focus	3
01410	Inmagic	2
MIL	dBase IV	3
	PC Focus	6

Job	Spreadsheet	# of
Series	Program	Users

00413	Statgraphics	1
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Job	Communications	# of
Series	Program	Users

00334	PCU	5
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	RAMNET	1
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00335	PCU	1
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MIL	Blast	2
-----	-------	---

	Rainbow Connection	2
--	--------------------	---

	PCU	1
--	-----	---

Job	Miscellaneous	# of
Series	Programs	Users

00080	Word Perf. Library	1
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00086	Word Perf. Library	1
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00180	SAS	1
-------	-----	---

	SPSS	1
--	------	---

	QFast	1
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00218	GraphTalk	1
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00310	Word Perf. Library	1
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00318	Print Master	1
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	Print Shop	1
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	Word Perf. Library	1
--	--------------------	---

	Newsroom Pro	1
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Job	Miscellaneous	# of
<u>Series</u>	<u>Programs</u>	<u>Users</u>
00334	Cora Draw	1
	Norton Util.	2
	Print Q	1
00404	Sigma Plot	1
	Basic	1
00644	Print Master	1
00675	Print Q	2
	Sideways	2
00699	3M Co. DRG Coder	11
01531	Print Q	2
	Sideways	2
MIL	Printmaster	6
	ORG Plus	2
	Word Perf. Library	4
	PCU V3R1	1
	Harv. Tot Proj Mgr	1
	Micro Medix	7
	Epistat	2
	Sigma Plot	2

APPENDIX E.
ANALYSIS OF NON-IBM COMPATIBLE
HARDWARE AND SOFTWARE USAGE REQUIREMENTS

Job			# of
Series	Computer	Programs	Users
00322	Apple IIE	Magic Windows	1
00602	MacIntosh	MS Word	1
00644	Apple IIE	Apple Writer	1
00651	Apple IIE	Magic Windows	1
MIL	MacIntosh SE	Mac Link	25
		Word processing	25
		Spreadsheet	25
		Graphics	25
	MacIntosh	MS Word	6
		MS Excel	4
		Stat View II	3
		Fox Base	3
		More II	2
		Cricket Presents	2
		MacWrite	2
	Apple IIE	Magic Windows	1
	Commodore 64	Word Pro	1

APPENDIX F. PERSONNEL TURNOVER

Job Series	Authorized Strength	Personnel Turnover		Average Annual Turnover ¹		Average Annual Turnover Rate ²
		1988	1987	Turnover ¹		Rate ²
00018	2	0	1	0.5		0.25
00080	2	0	0	0		0.00
00085	9	10	1	5.5		0.61
00180	5	1	1	1		0.20
00185	9	3	0	1.5		0.17
00186	8	2	3	2.5		0.31
00204	7	0	2	1		0.14
00260	1	1	0	0.5		0.50
00301	3	0	1	0.5		0.17
00302	1	0	0	0		0.00
00303	14	4	3	3.5		0.25
00304	7	4	1	2.5		0.36
00305	19	3	3	3		0.16
00309	2	0	0	0		0.00
00318	94	21	9	15		0.16
00322	37	12	5	8.5		0.23
00332	6	2	0	1		0.17
00334	10	4	1	2.5		0.25
00335	8	1	2	1.5		0.19
00343	5	2	1	1.5		0.30
00344	7	3	0	1.5		0.21

"REPRODUCED AT GOVERNMENT EXPENSE"

					Average
		Personnel		Average	Annual
Job	Authorized	Turnover		Annual	Turnover
Series	Strength	1988	1987	Turnover	Rate
00345	2	0	1	0.5	0.25
00350	4	0	1	0.5	0.13
00356	5	0	1	0.5	0.10
00403	2	1	0	0.5	0.25
00404	1	0	0	0	0.00
00413	1	0	0	0	0.00
00501	1	0	0	0	0.00
00503	1	2	0	1	1.00
00511	3	0	0	0	0.00
00525	7	0	0	0	0.00
00530	2	1	0	0.5	0.25
00560	2	1	0	0.5	0.25
00561	2	1	1	1	0.50
00601	3	1	0	0.5	0.17
00602	6	5	5	5	0.83
00610	88	21	10	15.5	0.18
00620	72	11	2	6.5	0.09
00621	55	15	4	9.5	0.17
00622	11	0	1	0.5	0.05
00625	1	0	0	0	0.00
00631	2	0	0	0	0.00
00633	1	0	0	0	0.00
00636	1	0	0	0	0.00

Job Series	Authorized Strength	Personnel Turnover		Average Annual Turnover	Average Annual Turnover Rate
		1988	1987	Turnover	Rate
00642	5	0	1	0.5	0.10
00644	63	3	5	4	0.06
00645	18	3	5	4	0.22
00646	6	0	0	0	0.00
00647	17	4	2	3	0.18
00648	2	0	1	0.5	0.25
00649	7	0	1	0.5	0.07
00651	7	1	4	2.5	0.36
00660	15	4	1	2.5	0.17
00661	9	1	1	1	0.11
00665	4	0	1	0.5	0.13
00667	2	0	0	0	0.00
00669	3	0	1	0.5	0.17
00671	4	2	0	1	0.25
00675	18	8	5	6.5	0.36
00679	89	26	16	21	0.24
00681	38	3	3	3	0.08
00682	4	0	0	0	0.00
00683	6	0	0	0	0.00
00688	1	0	0	0	0.00
00690	3	0	1	0.5	0.17
00699	26	1	0	0.5	0.02
00802	1	0	0	0	0.00

Job Series	Authorized Strength	Personnel Turnover		Average Annual Turnover	Average Annual Turnover Rate
		1988	1987	Turnover	Rate
00810	1	0	1	0.5	0.50
00962	5	3	1	2	0.40
00986	1	0	0	0	0.00
01020	5	0	1	0.5	0.10
01060	1	0	1	0.5	0.50
01082	1	0	1	0.5	0.50
01087	1	0	1	0.5	0.50
01102	7	2	1	1.5	0.21
01105	4	0	0	0	0.00
01106	2	2	0	1	0.50
01306	1	0	0	0	0.00
01320	1	0	0	0	0.00
01410	2	0	0	0	0.00
01411	2	0	0	0	0.00
01531	2	0	0	0	0.00
01702	2	2	0	1	0.50
02001	1	0	0	0	0.00
02003	2	0	0	0	0.00
02005	24	5	3	4	0.17
02010	2	0	0	0	0.00
02030	1	0	0	0	0.00
02091	1	1	0	0.5	0.50

Job Series	Authorized Strength	Personnel Turnover		Average Annual Turnover	Average Annual Turnover Rate
		1988	1987	Turnover	Rate
03111	2	0	1	0.5	0.25
03501	1	0	0	0	0.00
03566	4	1	0	0.5	0.13
04805	6	1	1	1	0.17
05703	1	0	0	0	0.00
06904	1	0	0	0	0.00
06907	24	2	1	1.5	0.06
07402	1	3	0	1.5	1.50
07404	20	2	1	1.5	0.08
07407	1	0	0	0	0.00
07408	55	5	2	3.5	0.06

¹Average Annual Turnover = Personnel Turnover 1987 +
Personnel Turnover 1988 / 2

²Average Annual Turnover Rate = Average Annual Turnover /
Authorized Strength

APPENDIX G. LETTER TO COMMERCIAL ENTERPRISES

May 1, 1989

Administrative Resident

Computer Training Institute
Hasegawa-Komuten Bldg.
820 Mililani Suite 123
Honolulu, HI 96813

Gentlemen:

I am currently working at Tripler Army Medical Center to complete requirements for a Masters Degree in Health Care Administration (HCA) from the U.S. Army-Baylor University HCA Program. One requirement is a Graduate Management Project that will assist the facility to improve its management. The title of my project is "To Determine the Most Effective Method of Providing Computer Literacy Training to New Employees at Tripler Army Medical Center." The study is focusing on microcomputer applications with a secondary focus on minicomputer applications for Wang, Sperry and Intel 310.

One of the alternatives to providing this training is the use of private contractors. To evaluate the feasibility of this alternative, request you provide me information delineating the training you provide. Information provided will be kept confidential. The information should include the following, at a minimum:

- a. courses offered;
- b. frequency of training;
- c. training objectives for each course;
- d. evaluation techniques, i.e., how both students and instruction are evaluated;
- e. size of classes;
- f. cost of the courses and discounts offered to the government or for volume;
- g. instructor qualifications;
- h. location of training.

Please mail the requested information to:

Commander
Tripler Army Medical Center
ATTN: HSHK-DCA-A
Tripler AMC, HI 96859-5000

Understand that this is neither a solicitation for bids nor a request for proposals from the government, but merely a survey of the market place. A government contract will not be the direct result of this survey.

If you have any questions please call me at 433-6439 or 433-5322. Thank you for your assistance.

Sincerely,

MICHAEL D. DALEY
Major, Medical Service Corps
Administrative Resident

APPENDIX H. EXTERNAL SOURCES OF TRAINING

A "Y" below indicates the computer system software listed in the left column, is trained by the source identified across the top (Sonoda 20 April 1989; Civilian Personnel Office 1989, IV.1-IV.11; Pacific Basin Computer Services 1989, 1-5; Dezarn 1989; Computer Training Institute 1989, 2-18; Navy Regional Data Automation Center--Pearl Harbor n.d., 4; Powell 1989; Rigg 1989; Kapiolani Community College 1988, 1-27; Flores, Joseph 1989; Fujio Matsuda Technology Training and Education Center 1989, n. pag.; Roosevelt University, Control Data Corporation n.d., n. pag.).

	Commer- Educa- cial tional				
	IC	CPOH	NARDAC	Firms	Inst.
Minicomputers					
Wang				Y	Y
Sperry				Y	
Intel 310	Y			Y	
IBM Compatible					
Microcomputers					
Introduction to					
Microcomputers and DOS	Y	Y	Y	Y	Y

Commer- Educa-
cial tional

	IC	CPOH	NARDAC	Firms	Inst.
Word Processing Programs					
Multimate	Y			Y	Y
Word Perfect			Y	Y	Y
Wang IWP				Y	
Microsoft Word				Y	Y
Displaywrite III				Y	
Wordstar			Y	Y	Y
WPS-Plus					
Database Management Programs					
dBase III	Y	Y	Y	Y	Y
dBase IV				Y	Y
PC Focus					
Spreadsheet Programs					
Lotus 1-2-3	Y	Y	Y	Y	Y
Supercalc					
Visicalc					
Integrated Programs					
Enable			Y	Y	
Symphony	Y				
Framework					
Communications Programs					
Procomm					Y
Cross Talk					
PCU					

Commer- Educa-
cial tional

	IC	CPOH	NARDAC	Firms	Inst.
Miscellaneous Programs					
Harvard Graphics				Y	
MS Windows					
Time Line					
News Master					
Print Master					
Word Perfect Library					
SPSS					
Print Q					
Sideways					
Non-IBM Compatible Microcomputers					
MacIntosh SE					
Mac Link				Y	Y
Word Processing				Y	Y
Spreadsheet				Y	Y
Graphics				Y	Y
MacIntosh					
MS Word				Y	Y
MS Excell				Y	Y

APPENDIX I.
PREFERRED SOURCE AND COST OF
ANNUAL TRAINING REQUIREMENT

The number of training courses required per month was determined from data in tables 10, 11, and 12. If the number of personnel requiring training each month is more than one but less than 11, one course is required. If between 11 and 20 personnel require training each month, two courses are required. If less than one person requires training each month, then that fraction becomes the monthly training requirement, e.g., if 0.5 users require a training course each month, the monthly course requirement is 0.5, or one course every two months. Cost data and length of training is based on vendor information (Sonoda 20 April 1989; Civilian Personnel Office 1989, IV.1-IV.11; Pacific Basin Computer Services 1989, 1-5; Dezarn 1989; Computer Training Institute 1989, 2-18; Navy Regional Data Automation Center--Pearl Harbor n.d., 4; Powell 1989; Rigg 1989; Kapiolani Community College 1988, 1-27; Flores, Joseph 1989; Fujio Matsuda Technology Training and Education Center 1989, n. pag.; Roosevelt University, Control Data Corporation n. d., n. pag.).

	Training Courses Per Month	Source ¹	Annual Cost-- Preferred Source	Length (Hours per Month)
Wang Minicomputer				
Word Processing	1	KCC	\$3325	8
Sperry Minicomputer	1	Unisys	34620	56
(All Applications)				
Intel 310 Minicomputer				
Word Processing	1	PBCS	1200	12
Database Management	1	PBCS	1200	12
Spreadsheet	1	PBCS	1200	12
Electronic Mail	1	PBCS	1200	12
IBM Compatible Microcomputers				
Introduction to				
Microcomputers and DOS 2		CTI	8640	32
Word Processing Programs				
Multimate	1	CTI	3724	8
Word Perfect	1	CTI	2156	8
Wang IWP	0.4	INFOPRO	1350	4.8
Microsoft Word	0.2	CTI	196	1.6
Displaywrite III	0.1	CTI	190	0.8
Wordstar	0.1	FMTT	95	1.2
WPS-Plus	0.1			

	Training Courses Per Month	Source	Annual Cost-- Preferred (Hours per Source Month)	Length (Hours per Month)
Database Management Programs				
dBase III	1	CTI	4410	8
dBase IV	0.2	CTI	196	1.6
PC Focus	0.3			
Spreadsheet Programs				
Lotus 1-2-3	1	CTI	4116	8
Supercalc	0.4			
Visicalc	0.4			
Integrated Programs				
Enable	1	NARDAC	23010	40
Symphony	0.4			
Framework	0.4			
Communications Programs				
Procomm	1	KCC	605	3
Cross Talk	1			
PCU	0.2			
Miscellaneous Programs				
Harvard Graphics	1	CTI	1875	8
MS Windows	0.8			
Time Line	0.4			
News Master	0.4			
Print Master	0.2			
Word Perfect Library	0.2			

	Training		Annual	
	Courses		Cost--	Length
	Per Month	Source	Preferred	(Hours per
			Source	Month)
SPSS	0.1			
Print Q	0.1			
Sideways	0.1			
Non-IBM Compatible Microcomputers				
MacIntosh SE				
Mac Link	0.5	MA	450	0.5
Word Processing	0.5	MA	1350	1.5
Spreadsheet	0.5	MA	1800	2
Graphics	0.5	MA	900	1
MacIntosh				
MS Word	0.2	MA	450	0.6
MS Excell	0.1	MA	300	0.4
TOTAL			\$98,558	243 hours

¹Sources of Training:

CTI--Computer Training Institute (commercial vendor);
 FMTT--Fujio Matsuda Technology Training and Education Center,
 Honolulu Community College (educational institution);
 INFOPRO (Commercial vendor);
 KCC--Kapiolani Community College (educational institution);
 MA--MicroAge (commercial vendor)
 NARDAC--Navy Regional Data Automation Center (government);
 PBCS--Pacific Basin Computer Services (commercial vendor).
 Unisys (commercial vendor).

APPENDIX J. AVAILABILITY OF TRAINING MEDIA

A "Y" below indicates courseware is available in the medium specified to support the system software listed in the left column. A "T" means the courseware is currently available at TAMC (Applied Learning n.d, n. pag.; Information Management Division 1989, 1).

	Video-	
	IV	Tape
IBM Compatible		
Microcomputers		
Introduction to		
Microcomputers and DOS	Y	T
Word Processing Programs		
Multimate	Y	T
Word Perfect	Y	T
Displaywrite III	Y	
Wordstar	Y	
Database Management Programs		
dBase III	Y	T
dBase IV	Y	
Spreadsheet Programs		
Lotus 1-2-3	Y	T
Integrated Programs		
Enable	Y	T
Symphony	Y	T

APPENDIX K.

TRAINING TIME COMPUTATION--IV, VIDEO TAPE

	Monthly Training Requirement (# of Persons)	Average Training Time per Course ^{1,2}	Average Monthly Training Time Requirement ³
IBM Compatible Microcomputers			
Introduction to Microcomputers and	13.8	8	110.0
Word Processing Programs			
Multimate	3.2	4	12.7
Word Perfect	1.8	4	7.3
Displaywrite III	0.1	4	0.3
Wordstar	0.1	6	0.5
Database Management Programs			
dBase III	3.8	4	15.0
dBase IV	0.2	4	0.7
Spreadsheet Programs			
Lotus 1-2-3	3.5	4	14.0
Integrated Programs			
Enable	6.5	4	26.0
Symphony	0.4	4	1.7
		Total	188.2 Hours/ Month

¹According to Ms. Cheryl Sinclair of Applied Learning, training time can be estimated based on the number of disk sides in a software program's courseware. Each disk side takes approximately one hour to complete viewing and practice of learned tasks requires another hour per disk side. Likewise, information from vendor literature indicates that training time for video tape and CBT is similar to that of IV (Reliant Technologies and Computer Technology Group--Telemedia, Inc. 1987, iv).

²Average Training Time per Course = number of disk sides (Applied Learning n.d, n. pag.) * 2.

³Average Monthly Training Time Requirement = Monthly Training Requirement * Average Training Time per Course.

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